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MATTER • 40000059-0150

FROM • Michael L. Day

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RENEWED PETITION UNDER 37 CFR 1.55(c) follows for Application No. 09/932,013, Filed August 17, 2001

27261988IV-1

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## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: David Barrington Everett et al.

Application No.: 09/932,013

Filed: August 17, 2001

Title: **SECURE MULTIPLE APPLICATION  
CARD SYSTEM AND PROCESS**

Group Art Unit: 2137

Examiner: Mathew Smithers

Attorney Docket No.: 40000059-0150

Confirmation No.: 4815

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail with sufficient postage in an envelope addressed to Mail Stop Petitions, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, and is further being communicated to the USPTO by facsimile to (571)273-8300, ATTN: Office of Petitions.

on March 2, 2007  
Date of Deposit

Edward J. Radlo, Reg. No. 26,793

Name of Person Mailing Correspondence

Edward J. Radlo March 2, 2007**Mail Stop PETITIONS**

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

FAX: 571-273-8300

**RENEWED PETITION UNDER 37 C.F.R. 1.55(c)**

Sir:

On November 20, 2006, Applicants filed with the United States Patent and Trademark Office (USPTO) a Petition to Accept Unintentionally Delayed Claim of Priority, accompanied by the claim, the surcharge, and a statement, as required by elements (1), (2) and (3), respectively, of 37 C.F.R. 1.55(c). In response to the Decision on Petition under 37 C.F.R. 1.55 (the "Decision"), mailed January 30, 2007, and as invited by the USPTO on page 2, second paragraph, of the Decision, a renewed petition is submitted herewith. The following is submitted:

**Renewed Petition under 37 CFR 1.55(c) begins on page 2 of this paper.****Remarks begin on page 3 of this paper.**

**Enclosures:** (1) Inventors' Declaration  
(2) Certified copy of priority document  
(3) Power of Attorney and Change of Correspondence Address

MAR 02 2007

## RENEWED PETITION UNDER 37 C.F.R. 1.55(c)

Pursuant to 35 U.S.C. §119(a) and 35 U.S.C. §120, the above-identified application is entitled to the benefit of the filing date of the following prior application: Great Britain patent application No. 9703591.9 filed on February 21, 1997 and entitled "Multiple Application Computer System." Applicants unintentionally failed to expressly claim this priority in the application as filed and unintentionally failed to present this claim during the time period provided by 37 C.F.R. §1.55(a).

APPLICANTS HEREBY PETITION FOR ACCEPTANCE OF THE  
UNINTENTIONALLY DELAYED CLAIM FOR PRIORITY

**(1) CLAIM:** "This application is a continuation of and claims priority to United States patent application no. 09/076,551, filed on May 12, 1998, entitled "Secure Multiple Application Card System and Process," now U.S. patent 6,317,832, which is a continuation of and claims priority to United States patent application 09/023,057 filed on February 12, 1998, entitled "Secure Multi-Application IC Card System Having Selective Loading and Deleting Capability," now U.S. patent 6,575,372; and this instant application also claims the priority benefit of United States provisional patent application 60/046,514 filed on May 15, 1997, entitled "Design for a Multi Application Smart Card"; United States provisional patent application 60/046,543 filed on May 15, 1997, entitled "Virtual Machine for a Multi Application Smart Card"; and Great Britain patent application 9703591.9 filed on February 21, 1997 and entitled "Multiple Application Computer System." All five of these prior applications are hereby incorporated by reference into the present patent application in their entireties."

**(2) PETITION FEE:** The surcharge of one thousand three hundred seventy dollars (\$1,370.00) set forth in 37 C.F.R. §1.17(t) for a large entity was included with the original Petition to Accept Unintentionally Delayed Claim of Priority, filed November 20, 2006.

**(3) STATEMENT:** The entire delay between the date the claim was due under 37 C.F.R. §1.55(a)(1) and the date the claim was filed was unintentional.

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REMARKS

Consideration of this Renewed Petition under 37 C.F.R. 1.55(c) (the "Renewed Petition"), and entry of the text immediately following "(1) CLAIM" of the Renewed Petition as the first paragraph of the specification of the instant application, are hereby respectfully requested.

The original Petition to Accept Unintentionally Delayed Claim of Priority filed November 20, 2006, (the "Original Petition") was filed concurrently with an Amendment under 37 C.F.R. §1.312 (the "Rule 312 Amendment"), which was enclosed with the Original Petition. The Rule 312 Amendment, which referenced the Original Petition and included a copy thereof, was entered by Examiner Smithers. The USPTO informed Applicants of this action by way of a paper mailed January 31, 2007. The Original Petition, however, was dismissed in a decision (the "Decision on Petition") by Legal Examiner Lin. The USPTO informed Applicants of this decision by way of a paper mailed to Applicants on January 30, 2007. Pursuant to the recommendations made in telephone conversations between Applicants' attorneys and both Examiners, and, as invited at page 2, second paragraph, of the Decision on Petition, Applicants are hereby submitting the enclosed Renewed Petition.

The Decision on Petition denied the Original Petition on the grounds that review of the file failed to disclose that the claimed priority information was included in an oath or declaration or in an Application Data Sheet, and, as a result, Examiner Lin was unable to determine that Applicants had complied with the requirements of 37 C.F.R. §1.63(c)(2). Enclosure 1 is a copy of the requested inventors' declaration identifying and claiming priority to Great Britain patent application 9703591.9 filed on February 21, 1997. This declaration was previously mailed to the USPTO on May 7, 1998, during the prosecution of U.S. patent application 09/023,057 (the grandparent of the instant application), and was filed by the USPTO on May 11, 1998. Because 37 C.F.R. §1.63(d) states that a newly executed oath or declaration is not required in a continuation application, and since the present application is a continuation of parent application 09/076,551, which is a continuation of grandparent application 09/023,057, the instant application has always been in compliance with the requirements of 37 C.F.R. §1.63.

The Decision on Petition also advised that Applicants must either file a certified copy of the foreign priority application, or, if already filed, identify the application containing the certified copy of the foreign priority application. The foreign priority application was in fact previously submitted during prosecution of the instant application on July 27, 2004 (with a paper denominated "Amendment and Claim of Priority"), and additionally was previously submitted during prosecution of U.S. patent application 09/023,057 (the grandparent application) at least twice (on February 5, 2003 and on April 15, 2003). Thus, the instant Application already complies with the requirements of 37 C.F.R. §1.55(a)(2). For the convenience of the Legal Examiner, Enclosure 2 is yet another certified copy of Great Britain patent application 9703591.9 filed on February 21, 1997.

The Decision on Petition further advised that the amendment to the specification failed to state the relationship of U.S. patent application 09/023,057, filed February 12, 1998, to the instant application. The priority claim language is being amended in accordance with the present Renewed Petition to clarify that the instant application "is a continuation of" and claims priority to parent U.S. patent application 09/076,551. This was already indicated on Addendum Sheet 2 of Applicants' Utility Patent Application Transmittal dated August 17, 2001, and was stated in the first paragraph of the instant application as originally filed. The priority claim language is being further amended in accordance with the present Renewed Petition to clarify that parent U.S. patent application 09/076,551 "is a continuation of" and claims priority to grandparent U.S. patent application 09/023,057. This was already indicated in the first paragraph of parent U.S. patent application 09/076,551 and in Item 63 on the face of parent U.S. patent 6,317,832, which issued from parent U.S. patent application 09/076,551. As discussed above, the foregoing changes to the priority claim language are mere formal clarifications, inasmuch as the instant application always stated that it is a continuation of the parent, and the parent application always stated that it is a continuation of the grandparent, in accordance with 37 C.F.R. 1.78(a)(2)(i).

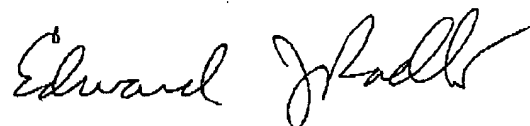
Applicants respectfully request the USPTO to (1) grant the present Renewed Petition and (2) enter the requested language in the first paragraph of the specification. If the petition is granted at a time by which the entry of the requested language cannot be made prior to issuance of the patent, Applicants are willing to obtain entry of the

MAR 02 2007

requested language by means of a Certificate of Correction after the instant application issues as a patent.

If there are any additional fees due in connection with this communication, please charge Deposit Account No. 19-3140. This sheet is being submitted in duplicate.

Respectfully submitted,



Edward J. Radlo  
Attorney of Record  
Reg. No. 26,793

March 2, 2007

SONNENSCHN NATH & ROSENTHAL LLP  
P. O. Box 061080  
Wacker Drive Station, Sears Tower  
Chicago, Illinois 60606-1080  
(415) 882-2402

enclosures: (1) Inventors' declaration  
(2) Certified copy of priority document  
(3) Power of Attorney and Change of Correspondence Address

cc: B. McKeon (w/o encl.)  
IP/T docket CH (w/o encl.)

Application No. 09/932,013: RENEWED PETITION TO ACCEPT  
UNINTENTIONALLY DELAYED CLAIM OF PRIORITY

ENCLOSURE i.

Inventors' Declaration as filed May 7, 1998 in U.S. patent application 09/023,057

BAKER &amp; TTS, L.L.P.

FILE NO.: A31503-2817/36731

**COMBINED DECLARATION  
AND POWER OF ATTORNEY****(Original, Design, National Stage of PCT, Divisional, Continuation or C-I-P Application)**

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name; I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:  
**SECURE MULTI-APPLICATION IC CARD SYSTEM HAVING SELECTIVE LOADING AND DELETING CAPABILITY**

This declaration is of the following type:

- ☒ original
- ☐ design
- ☐ national stage of PCT.
- ☐ divisional
- ☐ continuation
- ☐ continuation-in-part (C-I-P)

the specification of which: *(complete (a), (b), or (c))*

- (a) ☐ is attached hereto.
- (b) ☒ was filed on 2/12/98 as Application Serial No. 09/023,057 and was amended on *(if applicable)*.
- (c) ☐ was described and claimed in PCT International Application No. filed on and was amended on *(if applicable)*.

**Acknowledgement of Review of Papers and Duty of Candor**

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of the subject matter claimed in this application in accordance with Title 37, Code of Federal Regulations § 1.56.

☐ In compliance with this duty there is attached an information disclosure statement. 37 CFR 1.98.

**Priority Claim**

I hereby claim foreign priority benefits under Title 35, United States Code, § 119(a)-(d) of any foreign application(s) for patent or inventor's certificate or of any PCT International Application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT International Application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application on which priority is claimed

*(complete (d) or (e))*

- (d) ☐ no such applications have been filed.
- (e) ☒ such applications have been filed as follows:



BAKER &amp; BOTTS, L.L.P.

FILE NO.: A31503-2817/36731

PRIOR FOREIGN/PCT APPLICATION(S) FILED WITHIN 12 MONTHS (6 MONTHS FOR DESIGN) PRIOR TO SAID APPLICATION			
COUNTRY	APPLICATION NO.	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 35 USC 119
Great Britain	GB9703591.91	21-2-97	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/>
			<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/>
			<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/>
ALL FOREIGN APPLICATION(S), IF ANY, FILED MORE THAN 12 MONTHS (6 MONTHS FOR DESIGN) PRIOR TO SAID APPLICATION			
			<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/>
			<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/>
			<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/>

**Claim for Benefit of Prior U.S. Provisional Application(s)**

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below:

Provisional Application Number	Filing Date
60/046,514	5/15/97

**Claim for Benefit of Earlier U.S./PCT Application(s) under 35 U.S.C. 120**

*(complete this part only if this is a divisional, continuation or C-I-P application)*

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior application(s) in the manner provided by the first paragraph of Title 35, United States Code § 112, I acknowledge the duty to disclose information as defined in Title 37, Code of Federal Regulations, § 1.56 which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application:

(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)
--------------------------	---------------	---

(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)
--------------------------	---------------	---

**Power of Attorney**

As a named inventor, I hereby appoint Dana M. Raymond, Reg. No. 18,540; Frederick C. Carver, Reg. No. 17,021; Francis J. Hone, Reg. No. 18,662; Joseph D. Garon, Reg. No. 20,420; Arthur S. Tenser, Reg. No. 18,839; Ronald B. Hildreth, Reg. No. 19,498; Thomas R. Nesbitt, Jr., Reg. No. 22,075; Robert Neuner, Reg. No. 24,316; Richard G. Berkley, Reg. No. 25,465; Richard S. Clark, Reg. No. 26,154; Bradley B. Geist, Reg. No. 27,551; James J. Maune, Reg. No. 26,946; John D. Murnane, Reg. No. 29,836; Henry Tang, Reg. No. 29,705; Robert C. Scheinfeld, Reg. No. 31,300; John A. Fogarty, Jr., Reg. No. 22,348; Louis S. Sorell, Reg. No. 32,439 and Rochelle K. Seide, Reg. No. 32,300 of the firm of BAKER & BOTTS, L.L.P., with offices at 30 Rockefeller Plaza, New York, New York 10112, as attorneys to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

<b>SEND CORRESPONDENCE TO:</b> BAKER & BOTTS, L.L.P. 30 ROCKEFELLER PLAZA, NEW YORK, N.Y. 10112 CUSTOMER NUMBER: 21003	<b>DIRECT TELEPHONE CALLS TO:</b> BAKER & BOTTS, L.L.P. (212) 705-5000
---	--

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

BAKER &amp; TTS, L.L.P.

FILE NO.: A31503-2817/36731

FULL NAME OF SOLE OR FIRST INVENTOR	LAST NAME Everett	FIRST NAME David	MIDDLE NAME Barrington
RESIDENCE & CITIZENSHIP	CITY East Sussex	STATE or FOREIGN COUNTRY Great Britain	COUNTRY OF CITIZENSHIP Great Britain
POST OFFICE ADDRESS	POST OFFICE ADDRESS 31 Ashdown Avenue Saltdean, Brighton	CITY East Sussex	STATE or COUNTRY Gt. Britain
DATE 20/3/98	SIGNATURE OF INVENTOR		
FULL NAME OF SECOND JOINT INVENTOR, IF ANY	LAST NAME Miller	FIRST NAME Stuart	MIDDLE NAME James
RESIDENCE & CITIZENSHIP	CITY Berk	STATE or FOREIGN COUNTRY Great Britain	COUNTRY OF CITIZENSHIP Great Britain
POST OFFICE ADDRESS	POST OFFICE ADDRESS 9 Woodford Green The Warren, Bracknell	CITY Berk	STATE or COUNTRY Gt. Britain
DATE 20/3/98	SIGNATURE OF INVENTOR		
FULL NAME OF THIRD JOINT INVENTOR, IF ANY	LAST NAME Peacham	FIRST NAME Anthony	MIDDLE NAME David
RESIDENCE & CITIZENSHIP	CITY Kent	STATE or FOREIGN COUNTRY Great Britain	COUNTRY OF CITIZENSHIP Great Britain
POST OFFICE ADDRESS	POST OFFICE ADDRESS 4 Lynwood Groombridge, Turnbridge, Wells	CITY Kent	STATE or COUNTRY Gt. Britain
DATE 20 March 1998	SIGNATURE OF INVENTOR		
FULL NAME OF FOURTH JOINT INVENTOR, IF ANY	LAST NAME Simmons	FIRST NAME Ian	MIDDLE NAME Stephen
RESIDENCE & CITIZENSHIP	CITY Cambs	STATE or FOREIGN COUNTRY Great Britain	COUNTRY OF CITIZENSHIP Great Britain
POST OFFICE ADDRESS	POST OFFICE ADDRESS The Elms School Road, Broughton	CITY Cambs	STATE or COUNTRY Gt. Britain
DATE 20/3/98	SIGNATURE OF INVENTOR		
FULL NAME OF FIFTH JOINT INVENTOR, IF ANY	LAST NAME Richards	FIRST NAME Timothy	MIDDLE NAME Philip
RESIDENCE & CITIZENSHIP	CITY Herts	STATE or FOREIGN COUNTRY Great Britain	COUNTRY OF CITIZENSHIP Great Britain
POST OFFICE ADDRESS	POST OFFICE ADDRESS 32 Craig Mount, Radlett	CITY Herts	STATE or COUNTRY Gt. Britain
DATE 20/3/98	SIGNATURE OF INVENTOR		
FULL NAME OF SIXTH JOINT INVENTOR, IF ANY	LAST NAME Viner	FIRST NAME John	MIDDLE NAME Charles
RESIDENCE & CITIZENSHIP	CITY Surrey	STATE or FOREIGN COUNTRY Great Britain	COUNTRY OF CITIZENSHIP Great Britain
POST OFFICE ADDRESS	POST OFFICE ADDRESS Hydes, Woodlands Lane, Windlesham	CITY Surrey	STATE or COUNTRY Gt. Britain
DATE 20/3/98	SIGNATURE OF INVENTOR		

MAR. 2. 2007 5:25PM

SONNENSCHN NATH

NO. 2843 P. 13

Application No. 09/932,013: RENEWED PETITION TO ACCEPT  
UNINTENTIONALLY DELAYED CLAIM OF PRIORITY

ENCLOSURE 2.

Certified copy of priority document



INVESTOR IN PEOPLE

The Patent Office  
Concept House  
Cardiff Road  
Newport  
South Wales  
NP10 8QQ

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

I also certify that by virtue of an assignment registered under the Patents Act 1977, the application is now proceeding in the name as substituted.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 under the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

In accordance with the rules, the words "public limited company" may be replaced by p.l.c., plc, P.L.C. or PLC.

Re-registration under the Companies Act does not constitute a new legal entity but merely subjects the company to certain additional company law rules.

Signed

Dated 31 January 2003

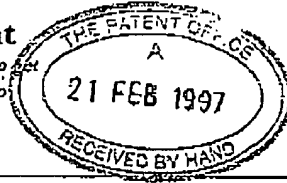
By virtue of a direction given under Section 30 of the Patents Act 1977, the application is proceeding in the name of

MONDEX INTERNATIONAL LIMITED, Incorporated in the United Kingdom, 9  
Cheapside, LONDON, EC2V 6AD, United Kingdom [ADP No. 07182124001]

Form 1/77

Patents Act 1977  
(Rule 16)The  
Patent  
Office

21 FEB 1997

24 FEB 97 09:55:29-4 008085  
POL/7700 25.00**Request for grant of a patent***(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)*

The Patent Office

Cardiff Road  
Newport  
Gwent NP9 1RH

1. Your reference

JCB/1378

2. Patent application number

*(The Patent Office will fill in this part)*

9703591.9

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*National Westminster Bank plc  
41 Lothbury,  
London EC2P 2EP  
England,  
United Kingdom.Patents ADP number *(if you know it)*

If the applicant is a corporate body, give the country/state of its incorporation

UNITED KINGDOM

4. Title of the invention

MULTIPLE APPLICATION COMPUTER SYSTEM

5. Name of your agent *(if you have one)*"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*REDDIE + GROSS  
16 THEOBALDS ROAD  
LONDON  
WC1X 8PLPatents ADP number *(if you know it)*Stevens, Hewlett & Perkins  
1 Serjeants Inn,  
Fleet Street,  
London, EC4Y 1LLD. Young & Co.,  
21 New Fetter  
Lane,  
London  
EC4A 1DA5/77  
6.2.98  
SEP.6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

Country

Priority application number  
*(if you know it)*Date of filing  
*(day / month / year)*

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing  
*(day / month / year)*8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*

YES

a) any applicant named in part 3 is not an inventor, or  
b) there is an inventor who is not named as an applicant, orc) any named applicant is a corporate body.  
*See note (d))*

## Patents Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form

Description 7

Claim(s)

Abstract

Drawing(s) 1

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (Patents Form 7/77)

Request for preliminary examination and search (Patents Form 9/77)

Request for substantive examination (Patents Form 10/77)

Any other documents (please specify)

11. I/we request the grant of a patent on the basis of this application.

*Stevens, Hewlett & Perkins*  
Signature 21/02/97

12. Name and daytime telephone number of person to contact in the United Kingdom

Stevens, Hewlett &amp; Perkins

J.C. BOYDELL 0171 936 2499

## Warning

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

## Notes

- If you need help to fill in this form or you have any questions, please contact the Patent Office on 0645 500505.
- Write your answers in capital letters using black ink or you may type them.
- If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.
- If you have answered 'Yes' Patents Form 7/77 will need to be filed.
- Once you have filled in the form you must remember to sign and date it.
- For details of the fee and ways to pay please contact the Patent Office.

Patents Form 1/77

## MULTIPLE APPLICATION COMPUTER SYSTEM

The invention relates to a computer system in which a population of computers has access to multiple applications. The computers may be personal computers (PC's) or, for example, integrated circuit cards (ICC's) known as "smart cards". The applications may be programs available from a variety of sources including computer tape or disc and in particular remote computers with which a serial link, typically by telephone, is established.

In the PC environment it is customary to distribute applications on floppy discs or CD ROMS and to retain them on a local hard disc for operation. In many ways this is inconvenient, demanding high capacity local storage media and presenting difficulties with updates. In the field of smart cards the problem of local application storage is much more acute, because storage capacity in the integrated circuit is relatively very limited. A solution in both cases is to make available applications held remotely and download them via a remote link. Internet and intranet systems are ideal vehicles for this and it is possible to run PC's from the internet application modules (or "applets" as they are called) for immediate running and then to discard them. The applets require no local long-term storage capacity. The system is known as JAVA.

Two difficulties are associated with downloaded applications. The first is hardware compatibility. Different computers have different microprocessors and different operating systems. It has been customary to re-write applications to cater for different computers, but this is cost-effective only for large, widely used and static applications. It is not practicable for applets. The second problem is control of the applets. Without control it would be possible for applets to make direct hardware calls to take control of local storage or communication devices. This could be mischievous at best and severely damaging or criminal at worst.



JAVA meets these two difficulties by ensuring that the applets are written in a common high-level interpreted language and that a local interpreter processes the applet instructions. Thus, all applets are written in the same language and the interpreter constitutes both a hardware and a control buffer. Similarly, and for the same reasons, proposals have been made for on-board interpreters in smart cards to run downloaded high-level language applications.

The wide availability of multiple applications to a population of computers raises another problem. For various reasons it may be desirable to restrict the availability of certain applications to certain computers. For example, some applications may make demands which the hardware of a particular computer cannot meet. These represent technical limitations present in spite of the interpreter arrangement. Furthermore there may be commercial or moral restraints to be placed on the accessibility of certain applications to certain computers. The present invention seeks to provide a solution to this problem.

According to the invention there is provided a computer system comprising a population of computers; tamper-resistant modules each associated respectively with one of said computers; a plurality of computer applications; provider means for holding the computer applications; and means for coupling the provider means to the computers for downloading the computer applications to the computers, wherein, in any given pair of (a) a tamper-resistant module and (b) an application there is included (i) with one member of the pair a class identifier identifying at least one class to which the member belongs and (ii) with the other member of the pair an exclusion bit-map specifying certain classes, the system being such that comparison of the class identifier with the exclusion bit-map allows certain applications to be inhibited from running on certain computers.

It will be appreciated that an exclusion bit-map may specify

classes which are excluded or may specify classes which are included. In the latter case the absence of an inclusion for a class is taken as an exclusion.

The arrangement according to the invention allows the provision of computer specific applications or application specific computers. Perhaps both the tamper-resistant module and the application have both class identifiers and bit-maps so that mutual control may be exercised. However, in a preferred embodiment of the invention the tamper-resistant module has the bit-map and the application has class identifiers. The integrity of the system depends upon both the bit-map and the class identifiers being secure. The tamper-resistant module secures the bit-map and the class identifiers are preferably secured by an encryption system in which a class identifier section of the application is digitally certified by a system manager.

In a preferred embodiment of the invention class identifiers are provided both for the tamper-resistant module (TRM) and the application. These are regarded respectively as TRM identifiers and application identifiers. Both the TRM and the application are issued by respective issuers and their identifiers can be considered in two parts, namely an I/D and an issuer. Thus, the two class identifiers may be represented as:-

- (a) TRM I/D
- (b) TRM Issuer
- (c) Application I/D
- (d) Application Issuer

The above four entities may be used to define access rights in the system.

The computers may be PC's, in which case the tamper-resistant modules may be smart cards read by readers attached to the computers or, for example, dongles, PC cards or PCMCIA cards connected

to the computers.

In a preferred embodiment of the invention the computers are embodied in integrated circuits which are themselves the tamper-resistant modules. Typically, the integrated circuits are mounted in smart cards.

5 The invention will further be described with reference to the accompanying drawings, of which:-

Figure 1 is a schematic diagram of a computer system embodying the invention;

Figure 2 is a diagram of the structure of an application  
10 message in the system of Figure 1; and

Figure 3 is a diagram of a bit-map and associated memory in the MCD of Figure 1.

Referring to Figure 1 there is shown in schematic form the relationship between entities in a computer system according to the  
15 invention. The system uses a large population of smart cards as individual computers, one of which is illustrated at 1 comprising an integrated circuit chip 2 (tamper-resistant module) which includes a microprocessor 3, random access memory (RAM) 4, read only memory (ROM) 5 and electrically erasable programmable read only memory (EEPROM) 6. A  
20 serial interface 7 is connected to a contact pad 8 whereby programs and data are passed to the chip 2.

For convenience the system will be designated hereinafter as MAOS (multi-application operation system). Smart cards such as 1 are designated MAOS card devices (MCD's). The MCD's are issued by MCD  
25 issuers and one is shown at 9. When issued, the MCD is carried and used by a user who inserts it into a card reader associated with a terminal or telephone to load applications and manipulate data. An example of such use is in the MONDEX (Registered Trade Mark) system of value transfer where the MCD incorporates an electronic purse application for receiving  
30 and paying "electronic cash". In this case the MCD issuer might be

MONDEX. Here it is important to note, however, that applications other than MONDEX applications are loadable on to the MCD.

Applications are issued by application issuers. One is shown at 10. Usually, the applications will be transmitted by telephone line but it is possible that they may be downloaded on to the MCD's from other sources such as a computer equipped with a smart card reader. The system is controlled by a MAOS system manager (MSM) which is accessible to the MCD issuers and the application issuers by telephone link.

10 When an MCD is issued by an MCD issuer it has:-

- (a) MCD I/D (identity) and
- (b) MCD Issuer

These are sent to the MSM with a request that the MCD be enabled subject to certain rules which govern applications which may be loaded on to the MCD. The MSM causes a bit-map to be written to the EEPROM of the MCD which will determine the required application access rules. The MCD is then enabled. The MCD has a set of encryption keys in a public/secret key system such as that known as RSA. The MSM has a database 11 which records the MCD public keys against their MCD I/D's. Also, there is a global key pair for the MSM and the enabling procedure.

When an application issuer wishes to prepare a new application for issue it will have:-

- (c) an Application I/D and
- (d) an Application Issuer

25 These details are passed to the MSM with a request for a digital certificate. The digital certificate is an encrypted certificate of the application including (c) and (d) together with the public key of the application issuer's public/secret key pair and signed with the secret key of the MSM.

30 When a user takes his enabled MCD and requests an

application from the application issuer he receives a message structured as shown in Figure 2. The message consists of an application unit 12 signed cryptographically with the application issuer's secret key, giving a digital signature 13 and certified by the MSM certification key 14 which, as stated above, includes at least items (c) and (d) together with the application issuer's public key.

The procedure then adopted at the MCD is:-

- (1) Apply the MSM public key to verify the message and derive (c), (d) and the application issuer's public key;
- (2) Check (c) and (d) against the exclusion bit-map held in EEPROM to determine whether the program is excluded.
- (3) If so, abort. If not
- (4) Apply the application issuer's public key to derive the application and load it into EEPROM.

Unlike the JAVA scenario, the application will remain loaded until it is deliberately deleted. There are restrictions on who may delete applications and deletion requests must be made to an authorised body such as the MCD issuer or perhaps the application issuer.

Figure 3 shows schematically the bit-map held in EEPROM.

- The bit-map 15 is a set of 160 contiguous bits (20 bytes). Generally, different bits code for different predetermined characteristics represented in items (c) and (d). For example, the application I/D may include a code classifying it as a legal application with an additional classification for English language. Item (d) will define the program issuer. In the bit-map 15 the first four bits might code for program types: Financial; Legal; Medical; Recreational. The next twenty bits might be coded for respective application issuers. The bits are set with a binary '1' if the code is acceptable for the application to be loaded and with '0' if not. Thus, if any of the parameters of items (c) and (d) correspond with an exclusion '0' in the bit-map then the process is aborted and the application is not loaded.

Otherwise the application is loaded and retained.

In addition to the bit-map 15 there is a single-bit flag 16 and an application serial number at 17 (63 bytes). The purpose of this is to allow the special case where the MCD is set up to accept only one program identified by serial number. If the flag 16 is set then the bit-map is ignored and a check is made for the required serial number.

It will be understood that the program for effecting the bit-map and serial number checking described above is permanently held in ROM on EEPROM and is evoked automatically when an application is to be loaded.

In the system described above, the MCD has items (a) and (b) together with rules held in the bit-map with regard to unacceptable components of items (c) and (d). The application has items (c) and (d). It is possible, however, for the applications to carry rules with regard to unacceptable components of items (a) and (b). In that sense there will be a bit-stream in the application which can be held in MCD memory as the application bit-map. This can be equivalent in all respects to the structure and operation of the MCD bit-map. Thus there may be an MCD bit-map, an application bit-map or both.

In some applications parts of the application itself may be enciphered. If so, use can be made of the public key of the MCD to effect key recovery for deciphering.

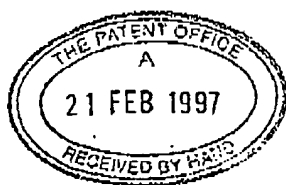
Having regard to the foregoing description it will be appreciated how the invention may be applied to the PC environment where a PC/tamper-resistant module combination is substituted at the user for the MCD.

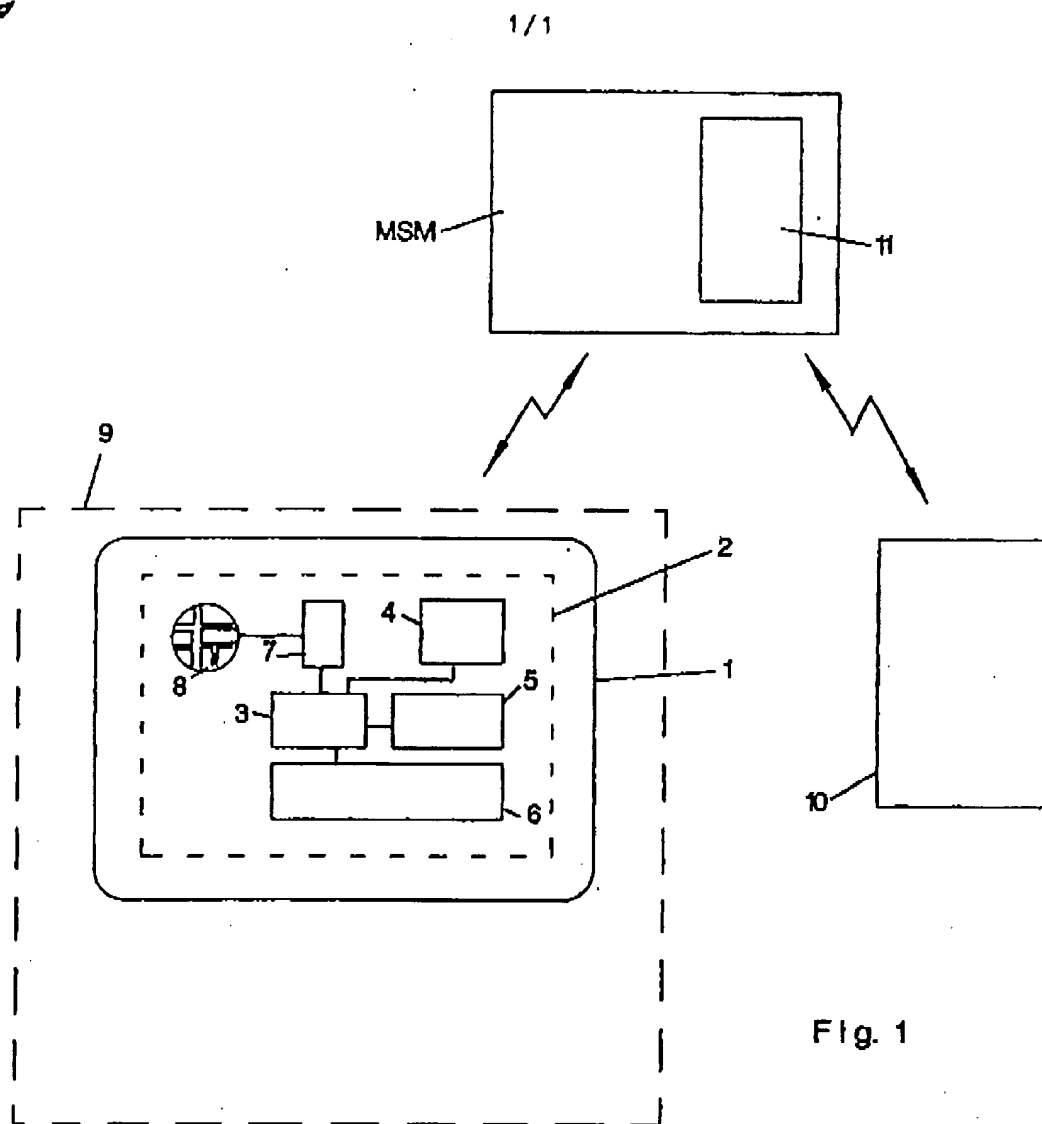
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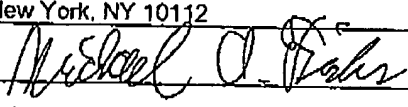
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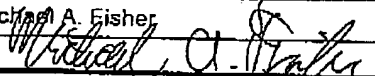
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<b>TRANSMITTAL FORM</b> <i>(to be used for all correspondence after initial filing)</i>	Application Number	09/023,057	
	Filing Date	February 12, 1998	
	First Named Inventor	Everett et al.	
	Group Art Unit	2165	
	Examiner Name	M. Tremblay	
Total Number of Pages in This Submission		Attorney Docket Number	A31503 - 072817.0118

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TO Examiner Mark Tremblay - Group Art Unit 2165  
U.S. Patent and Trademark Office

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### MESSAGE

Re: U.S. Patent Appln. Serial No. 09/023,057  
for "Secure Multi-Application IC Card  
System Having Selective Loading and  
Deleting Capability"  
Our Docket No. A31503-072817.0118

Dear Examiner Tremblay:

As you requested, enclosed is a copy of the foreign priority document, Great Britain Appln. No. 9703591.9, relating to the above-identified U.S. application.

Sincerely,

Robert C. Scheinfeld

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